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William J.Harmon,III Esq.
Vierra Magen Marcus Harmon & DeNiro LLP
685 Market Street
Suite 540
San Francisco, CA 94105

EXAMINER	
EDELMAN, BRADLEY E	

ART UNIT	PAPER NUMBER
2153	11

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/051,053	Applicant(s) LOLAYEKAR ET AL.	
	Examiner Bradley Edelman	Art Unit 2153	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 December 2003*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6 and 8-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6 and 8-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 January 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

This action is in response to Applicant's amendment and request for reconsideration filed on December 22, 2003. Claims 1-6 and 8-26 are presented for further examination.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

1. Claims 1-6, 8-16, and 19-22 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In considering claim 1, the claim contains the following ambiguities:

a. The term "the switch" on line 2 of the claim is unclear because it lacks clear antecedent basis. The claim previously mentions "at least one switch," but it does not clarify which of those switches constitutes "the switch."

b. Line 7 of the claim begins with the following: "for port each, dynamically load balancing amongst the paths...." The phrase "for port each does not make sense and appears to be incorrect. It appears that the phrase should read "for each request."

c. On line 8 of the claim, the phrase "on at least each request" is confusing and appears to be incorrect. Taken in context the phrase describes "using said respective processing circuitry... on at least each request." It is not clear how the system could use the circuitry for more than each request.

Claims 2-6 depend from claim 1 and are thus rejected for the same reasons.

In considering claim 8, the phrase "said affiliated processing circuitry" on line 8 of the claim lacks sufficient antecedent basis. The claim mentions "*respective* processing circuitry affiliated with each respective port," and so it is unclear as to which of the respective processing circuitry "said affiliated processing circuitry" refers.

Claims 9 and 11 contain the same ambiguities as claim 8 (see the last line of each claim).

Claim 10 depends from claim 9, and claims 12-14 depend from claim 11. Thus claims 10 and 12-14 are rejected for the same reasons as claims 9 and 11.

In considering claim 15, the phrase "the path with the shortest average response time affiliated with each of the ports" on lines 4-5 of the claim lacks sufficient antecedent basis. The claim mentions a single path with a response time, but doesn't mention a path affiliated with a port or finding a path with a shortest average response time.

Claim 16 depends from claim 15 and is thus rejected for the same reason.

In considering claim 19, line 5 of the claim is ambiguous because it states, "via at least one port the switch." This phrase appears to be missing a word, and should perhaps read "via at least one port *of* the switch."

Claims 20-22 depend from claim 19 and are thus rejected as well.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1, 3, 4, and 17 are rejected under 35 U.S.C. 102(a) as being anticipated by Molero et al. ("On the Switch Architecture for Fibre Channel Storage Area Networks," June 2001, hereinafter "Molero").

In considering claim 1, as understood, Molero discloses a method for use in a system for storing and accessing data ("SAN"), the system including at least one initiator ("source") and at least one target ("destination") and at least one switch ("switch"), each switch including a plurality of ports ("ports") and respective processing circuitry affiliated with each respective port ("input buffers"), the method comprising:

Providing a plurality of paths to the target from the initiator, each path passing through at least one port of the switch ("selecting an output link"); and

For each request, dynamically load balancing among the paths by the switch using respective processing circuitry affiliated with each respective port on the switch ("in case that multiple incoming messages request the same output link, the routing and arbitration unit must provide for arbitration between them"). See Molero, § 2.1.

In considering claim 3, Molero further discloses that the target is a physical storage device ("storage device," see § 1).

In considering claim 4, Molero further discloses that the target is a virtual target (the software receiving the communication at the storage device is a "virtual" target).

In considering claim 17, claim 17 describes a switch for performing the same steps as described in claim 1 and is thus rejected for the same reasons. See Molero, § 2.1.

3. Claims 1, 3, 4, and 17 are rejected under 35 U.S.C. 102(e) as being anticipated by Bhaskaran (U.S. Patent No. 6,266,335).

In considering claim 1, as understood, Bhaskaran discloses a method for use in a system for storing and accessing data, the system including at least one initiator ("client" or "router") and at least one target ("server") and at least one switch ("network flow switch"), the at least one switch including a plurality of ports ("input/output ports") and respective processing circuitry affiliated with each respective port (inherent in an input/output port) (col. 5, lines 47-51; col. 6, line 63 – col. 7, line 3), the method comprising:

Providing a plurality of paths to the target from the initiator, each path passing through at least one port of the at least one switch (Figs. 2 & 4A; col. 6, line 63 – col. 7, line 3); and

For each request, dynamically load balancing among the paths by the at least one switch using processing circuitry affiliated with at least one respective port on the at least one switch (col. 7, lines 24-25, "a packet is received on a port of one of the Ethernet cards...," and lines 32-35, "[s]tage 435 performs an optional load balancing operation to determine which of the IP servers... packet 300 is to be routed to.").

In considering claim 3, Bhaskaran further discloses that the target is a physical storage device ("server").

In considering claim 4, Bhaskaran further discloses that the target is a virtual target (the software receiving the communication at the server is a "virtual" target).

In considering claim 17, claim 17 describes a switch for performing the same steps as described in claim 1 and is thus rejected for the same reasons.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 19-22, are rejected under 35 U.S.C. 103(a) as being unpatentable over Bhaskaran, in view of Jindal et al. (U.S. Patent No. 6,324,580, hereinafter "Jindal").

In considering claim 19, as understood, Bhaskaran discloses a storage network (Fig. 2), including:

An initiator (col. 5, line 50; col. 4, line 48; "client" or "router");

A target (col. 5, line 47, "server");

A switch (col. 5, line 36, "network flow switch");

A plurality of paths from the initiator to the target via at least one port ("port") of the switch (Figs. 2 & 4A; col. 6, line 63 – col. 7, line 3);

Wherein the switch is designed to forward a request from the initiator to the target along a selected path according to a load balancing function using processing circuitry affiliated with each of the ports (col. 7, lines 24-25, "a packet is received on a port of one of the Ethernet cards...," and lines 32-35, "[s]tage 435 performs an optional load balancing operation to determine which of the IP servers... packet 300 is to be routed to.").

However, Bhaskaran does not disclose that the switch includes statistical information regarding the response time for each path, and forwarding the request from the initiator to the target along the path with the shortest response time. Nonetheless, in a similar art, Jindal discloses a load balancing method for balancing load among servers, including maintaining statistical information regarding the response time for each path (col. 6, lines 15-18, "collect, assemble and analyze the various pieces

information"), and forwarding a request received by the load balancer from an initiator to a target along the path with the shortest response time (col. 5, lines 26-63; col. 6, lines 47-40, "the selected policy requires choosing the least-loaded server (e.g., that which has the fastest response time)").

Given the teaching of Jindal, a person having ordinary skill in the art would have readily recognized the desirability and advantages of including the load balancing scheme taught by Jindal in the system taught by Bhaskaran, because using the path with the shortest response time will ensure a faster response and reduce the delay for requests. Thus, it would have been obvious to use the shortest response time load balancing method taught by Jindal in the system taught by Bhaskaran.

In considering claim 20, Bhaskaran further discloses that the target is a physical storage device ("server").

In considering claim 21, Bhaskaran further discloses that the target is a virtual target (the software receiving the communication at the server is a "virtual" target).

In considering claim 22, Bhaskaran further discloses that the target is a mirrored target with a plurality of members, such that the paths are respective to each member (the "storage devices," i.e. servers, taught by Bhaskaran are in fact mirrored virtual targets having a plurality of members - col. 1, lines 34-46, describe a "cluster" of servers

with the same "virtual" IP address that can all respond to requests for particular information).

5. Claims 2, 5, 6, 8-16, 18, and 23-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bhaskaran, in view of Jindal, and further in view of Ito et al. (U.S. Patent No. 5,721,904, hereinafter "Ito").

In considering claim 2, the system taught by Bhaskaran discloses dynamically load balancing to select the paths, but does not describe a particular scheme to use for load balancing, such as the average response time method claimed in claim 2 (instead, Bhaskaran refers to another document that describes load balancing techniques). Nonetheless, in a similar art, Jindal discloses a load balancing method for balancing load among servers, including determining a response time for each path, and passing a request received by the load balancer from an initiator to a target along the path with the shortest response time (col. 5, lines 26-63; col. 6, lines 47-40, "the selected policy requires choosing the least-loaded server (e.g., that which has the fastest response time)"). Given the teaching of Jindal, a person having ordinary skill in the art would have readily recognized the desirability and advantages of including the load balancing scheme taught by Jindal in the system taught by Bhaskaran, because using the path with the shortest response time will ensure a faster response and reduce the delay for requests. Thus, it would have been obvious to use the shortest response time load balancing method taught by Jindal in the system taught by Bhaskaran.

Note that the combined system of Jindal and Bhaskaran does not disclose measuring a shortest *average* response time, as claimed. Nonetheless, using a shortest average response time to determine which server to select in a load balancing system is well known, as evidenced by Ito (col. 18, lines 30-36, "the selection operation by one or both of the methods based on response time is executed a plurality of times [so] that the server component having the shortest average response time is selected"). Given this teaching, it would have been obvious to a person having ordinary skill in the art to load balance in the system taught by Jindal and Bhaskaran according to a shortest *average* response time, as taught by Ito, to "[prevent] the effect of change in temporary network traffic congestion" (see Ito, col. 18, lines 34-36).

In considering claim 5, claim 5 includes the same limitation as claim 2, and adds that the target is a mirrored target with a plurality of members. Bhaskaran further discloses that the target is a mirrored target with a plurality of members (col. 1, lines 34-46, describing a "cluster" of servers with the same "virtual" IP address that can all respond to requests for particular information).

In considering claim 6, Bhaskaran further discloses that the request is a read request (i.e. accesses to a web page are read requests – see col. 1, lines 17-22).

In considering claim 8, as understood, Bhaskaran discloses a method for use in a storage network including an initiator ("client" or "router"), a storage device ("server")

and a switch ("network flow switch"), the switch including a plurality of ports ("input/output ports") and respective processing circuitry affiliated with each respective port (inherent in an input/output port) (col. 5, lines 47-51; col. 6, line 63 – col. 7, line 3), the method comprising:

Providing a plurality of paths from the storage device to the initiator, each path passing through at least one port of the switch (Figs. 2 & 4A; col. 6, line 63 – col. 7, line 3); and

For each request, dynamically load balancing among the paths by the switch using the processing circuitry (col. 7, lines 24-25, "a packet is received on a port of one of the Ethernet cards...," and lines 32-35, "[s]tage 435 performs an optional load balancing operation to determine which of the IP servers... packet 300 is to be routed to.").

However, Bhaskaran does not disclose that the load balancing includes determining an average response time for each path, and passing a request received by the load balancer from an initiator to a storage device with the shortest average response time. Nonetheless, a load balancing method for balancing load among servers, including determining a response time for each path, and passing a request received by the load balancer from an initiator to a target along the path with the shortest response time, is well known, as evidenced by Jindal (col. 5, lines 26-63; col. 6, lines 47-40, "the selected policy requires choosing the least-loaded server (e.g., that which has the fastest response time)"). Given the teaching of Jindal, a person having ordinary skill in the art would have readily recognized the desirability and advantages of

including the load balancing scheme taught by Jindal in the system taught by Bhaskaran, because using the path with the shortest response time will ensure a faster response and reduce the delay for requests. Thus, it would have been obvious to use the shortest response time load balancing method taught by Jindal in the system taught by Bhaskaran.

Note that the combined system of Jindal and Bhaskaran does not disclose measuring a shortest *average* response time, as claimed. Nonetheless, using a shortest average response time to determine which server to select in a load balancing system is well known, as evidenced by Ito (col. 18, lines 30-36, "the selection operation by one or both of the methods based on response time is executed a plurality of times [so] that the server component having the shortest average response time is selected"). Given this teaching, it would have been obvious to a person having ordinary skill in the art to load balance in the system taught by Jindal and Bhaskaran according to a shortest *average* response time, as taught by Ito, to "[prevent] the effect of change in temporary network traffic congestion" (see Ito, col. 18, lines 34-36).

In considering claim 9, claim 9 contains the same limitations as claim 8, except that the term "storage device" from claim 8 is further defined as a "mirrored virtual target having a plurality of members" in claim 9. Nonetheless, Bhaskaran teaches this additional limitation. The "storage devices," i.e. servers, taught by Bhaskaran are in fact mirrored virtual targets having a plurality of members (col. 1, lines 34-46, describing a

"cluster" of servers with the same "virtual" IP address that can all respond to requests for particular information). Thus claim 9 is rejected under the same grounds as claim 8.

In considering claim 10, Bhaskaran further discloses that the request is a read request (i.e. accesses to a web page are read requests – see col. 1, lines 17-22).

In considering claim 11, claim 11 presents the same limitations as claim 8, and further describes that selection method applies to two separate initiators making requests to both physical storage devices and mirrored targets with a plurality of members. Nonetheless, as described with regard to claims 8 and 9, Bhaskaran discloses that the targets are both physical storage devices (i.e. servers) and mirrored targets with a plurality of members (col. 1, lines 34-46, describing a "cluster" of servers with the same "virtual" IP address that can all respond to requests for particular information).

In considering claims 12-13, Bhaskaran further discloses that linecards ("ethernet cards") are used to route the requests to the storage devices and mirrored targets. See col. 7, lines 23-25, "initially, a packet is received on a port of one of Ethernet cards 415, 416, 417, or 418." See also, col. 7, lines 46-48, "the packet is transferred the [sic] one of Ethernet cards 415, 416, 417, or 418 to which the IP server specified by the Data Link Layer destination address field of packet 300 is connected." Thus, as a matter of

course, some requests will be received by the different linecards, and others will be received by the same linecard, as required in claims 12 and 13 respectively.

In considering claim 14, claim 14 further requires that the step of determining an average response time for the request is performed by each linecard. Although, it would have been obvious to a person having ordinary skill in the art to use the linecards taught by Bhaskaran to determine the average response time in the system taught by Bhaskaran, Jindal, and Ito, because hardware devices provide for faster processing than software products.

In considering claim 15, claim 15 describes a switch for performing the same method as claim 8, and is thus rejected for the same reasons as claim 8.

In considering claim 16, Bhaskaran further discloses that the load balancing circuitry includes a storage processor and a CPU (Fig. 4A, "Memory controller" and "CPU").

In considering claim 18, Jindal further discloses means for maintaining statistics for the response time of each path (col. 6, lines 15-18, "collect, assemble and analyze the various pieces information") and means for passing a request received by the switch from the initiator to the target along the path with the shortest response time ((col. 5,

lines 26-63; col. 6, lines 47-40, "the selected policy requires choosing the least-loaded server (e.g., that which has the fastest response time)")

Note that the combined system of Jindal and Bhaskaran does not disclose measuring a shortest *average* response time, as claimed. Nonetheless, using a shortest average response time to determine which server to select in a load balancing system is well known, as evidenced by Ito (col. 18, lines 30-36, "the selection operation by one or both of the methods based on response time is executed a plurality of times [so] that the server component having the shortest average response time is selected"). Given this teaching, it would have been obvious to a person having ordinary skill in the art to load balance in the system taught by Jindal and Bhaskaran according to a shortest *average* response time, as taught by Ito, to "[prevent] the effect of change in temporary network traffic congestion" (see Ito, col. 18, lines 34-36).

In considering claim 23, claim 23 describes a machine readable medium with instructions for performing the same method as claim 8, and is thus rejected for the same reasons as claim 8.

In considering claim 24, Bhaskaran further discloses that the target is a physical storage device ("server").

In considering claim 25, Bhaskaran further discloses that the target is a virtual target (the software receiving the communication at the server is a "virtual" target).

In considering claim 26, Bhaskaran further discloses that the target is a mirrored target with a plurality of members, such that the load balancing function in the combined system of Bhaskaran, Jindal, and Ito would determine a response time for each member of the mirrored target and pass the request to the member with the shortest average response time (the "storage devices," i.e. servers, taught by Bhaskaran are in fact mirrored virtual targets having a plurality of members - col. 1, lines 34-46, describe a "cluster" of servers with the same "virtual" IP address that can all respond to requests for particular information).

Response to Arguments

Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bradley Edelman whose telephone number is (703) 306-3041. The examiner can normally be reached on Monday to Friday from 8:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glen Burgess can be reached on (703) 305-4792. The fax phone numbers for the organization where this application or proceeding is assigned are as follows:

For all After Final papers: (703) 746-7238.

For all other correspondences: (703) 746-7239.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

GLENTON B. BURGESS
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100

BE
April 15, 2004